

CLAIMS

1. A method for producing crystals wherein the crystals
are grown from a liquefying raw material in a crucible
5 retained in a furnace and slowly cooling the raw material
in the crucible from below upward, said method being
characterized in that:

heating heaters are controlled so as to have a lower
temperature area than a crystallization temperature
10 downward and a higher temperature area than the
crystallization temperature above thereof in a
temperature distribution in a vertical direction in the
furnace in which the crucible is retained, and

a resupply raw material supplied from a raw material
15 supply apparatus placed above the crucible is supplied
into the crucible by heating to the same temperature as
in the higher temperature area.

2. The method for producing the crystals according to
20 Claim 1, wherein the temperature in the higher temperature
area is a soaking temperature.

3. The method for producing the crystals according to
Claim 1, wherein the temperature in the higher temperature
25 area is an overheating treatment temperature.

4. The method for producing the crystals according to

Claim 1, wherein a major component of the crystal is composed of oxide or carbonate of Ia and Va groups in a periodic table, the Ia group is lithium or potassium and the Va group comprises at least one of niobium and
5 tantalum.

5. The method for producing the crystals according to Claim 1, wherein a major component of the crystal is composed of oxide or carbonate of Ia and Va groups in
10 a periodic table, the Ia group is lithium or potassium, the Va group comprises at least one of niobium and tantalum, and one or more of Ia and IIa groups in the periodic table are contained as added impurities.

15 6. An apparatus for producing crystals wherein the crystals are grown from a liquefying raw material in a crucible retained in a furnace and slowly cooling the raw material in the crucible from below upward, being characterized by comprising:

20 a raw material supply apparatus which supplies a resupply raw material; and

a reflection plate placed above the crucible, which liquefies the resupply raw material supplied from the raw material supply apparatus and drops it as a liquid
25 into the crucible.

7. The apparatus for producing the crystals according

to Claim 6, wherein the reflection plate is in a funnel shape which narrows from above downward and provided with a drop opening which drops the liquid raw material into the crucible at its bottom portion.

5

8. The apparatus for producing the crystals according to Claim 7, wherein the reflection plate has a plurality of grooves from its extension to the drop opening on an inner surface of the funnel shape so that the resupply raw material is held on the surface for a certain time.

10

9. The apparatus for producing the crystals according to Claim 6, wherein the reflection plate is in a bugle shape which expands downward.

15

10. The apparatus for producing the crystals according to Claim 9, wherein the reflection plate has a plurality of grooves from its center to the extension on an outer surface of the bugle shape so that the resupply raw material is held on the surface for a certain time.

20

11. The apparatus for producing the crystals according to Claim 6, wherein the reflection plate is configured so as to move independently from the crucible.

25

12. The apparatus for producing the crystals according to Claim 6, wherein the reflection plate comprises a

heating heater.

13. The apparatus for producing the crystals according to Claim 6, wherein the raw material supply apparatuses
5 are placed for each of multiple resupply raw materials having different compositions and each supply amount of the resupply raw materials can be controlled.

14. The apparatus for producing the crystals according
10 to Claim 6, wherein a major component of the crystal is composed of oxide or carbonate of Ia and Va groups in a periodic table, the Ia group comprises lithium or potassium and the Va group comprises at least one of niobium and tantalum.

15

15. The apparatus for producing the crystals according to Claim 6, wherein a major component of the crystal is composed of oxide or carbonate of Ia and Va groups in a periodic table, the Ia group comprises lithium or
20 potassium, the Va group comprises at least one of niobium and tantalum, and one or more of Ia and IIa groups in the periodic table are contained as added impurities.